

# ESTABLISHING A NATIONAL NON-DESTRUCTIVE TESTING CENTRE (MAK/8/003)

F5

## MODEL PROJECT

### CORE FINANCING

YEAR	Experts		Group Activity	Equipment	Fellowships		Scientific Visits		Group Training	Sub-Contracts	Misc. Comp.	TOTAL
	m/d	US \$	US \$	US \$	m/d	US \$	m/d	US \$	US \$	US \$	US \$	US \$
1997	1/15	19,800	0	25,000	2/0	6,300	0/0	0	0	0	0	51,100
1998	1/7	17,205	0	20,000	4/0	13,200	0/0	0	0	0	0	50,405
1999	1/7	18,130	0	30,000	0/0	0	0/0	0	0	0	0	48,130

First Year Approved: 1995

Total expenditure to 30 September 1996:

\$55,470 (TCF)

**OBJECTIVES:** This project deals with the need to upgrade industrial and manufacturing practices to internationally competitive quality norms. The project's specific contributions will be the modernization of the country's major non-destructive testing centre and retraining its staff.

**BACKGROUND:** Non-destructive testing (NDT) is an essential tool for the quality control of engineering materials, manufacturing processes, reliability of products in service, and maintenance of systems whose premature failure could be costly or even disastrous. This project was approved as part of the 1995-96 programme with footnote-a/ status, upgraded in 1996. The Centre for Application of Radioisotopes in Science and Industry (CARSi), Skopje, is the main NDT centre in the country, with about twenty users in Skopje, Bitola and other towns. It has about 200 NDT personnel, of which 60 are engineers and 140 are technicians or equivalent, using mainly radiographic, ultrasonic, visual and leak test methods. Most of the equipment at CARSi is at least 10 to 15 years old and facilities are limited. Approximately 10,000 radiographic, 5000 ultrasonic and 500 leak test operations are carried out every year in addition to 2500 in-service inspections and 500 visual tests. To meet current and future demands, about 450 additional NDT qualifications and certifications covering the four basic NDT techniques at Levels I, II and III need to be made in the next three years. Recent events in the region have led to restored export opportunities, increased foreign investment, improved communications and co-operation with neighbouring countries. All this is expected to help restore industrial production to full capacity but will increase the use of NDT and the number of highly qualified NDT personnel required. Current NDT activities support the metallurgical industry in such areas as casting, welding, millwork, forging and pressworking. Manufacturing and mining account for about 40% of Gross Social Product and is one of the main sources of employment. The GAMMA pipeline was completed in 1995 to supply natural gas from Russia, and will feed the local gas distribution network planned for Skopje. Radiographic and ultrasonic NDT is used to test the pipe system during construction and maintenance and after overloads, accidents or earthquakes, to avoid accidents or breakdowns in the pipeline and cuts in supply. An old refinery near Skopje required extensive NDT to keep it operational and extend its working life, and its pipes and pressure vessels need to be controlled with visual and ultrasonic testing. CARSi personnel make regular NDT inspections of the pipeline that transports most of the crude oil from Thessaloniki to the refinery. The country has two thermal power plants and three hydro-electric power plants. Increasing electricity needs may require full exploitation of remaining hydro energy resources and the construction of further plants whose components will require extensive NDT during manufacture and operation. NDT is also vital to transport infrastructure, such as railways and roads, and to civil engineering, such as bridges, steel structures, iron and concrete buildings, in addition to 1000 km of rail track and 10,500 km of road. A rail link between Skopje and the Bulgarian border is under construction and there are plans to extend the railway west to Albania.

**PROJECT PLAN:** March 1997: Delivery of training material for radiographic testing Level II and training/certification material for Level III, an X-ray unit and a gamma-ray unit with Ir-192, as well as equipment to set up a darkroom. Training in radiography Level II will take place on receipt of the training material. Five to ten participants for the Level III tentative examination and candidates for the radiographic training course Level II will be selected by CARSi. April 1997: Commercial marketing instruction for NDT management, followed by scientific visits to take a Level III examination/certification (two persons at least). June 1997: Delivery of the first ultrasonic flaw detector with accessories. October 1997: Ultrasonic testing Level I training course. Six staff members from CARSi will receive practical on-the-job training in radiographic, ultrasonic, magnetic particle, visual, liquid penetrant and pressure testing methods to be followed later by certification. June 1998: Training and examination for ultrasonic testing Level II, with later certification. March 1999: Delivery of magnetic particle and liquid penetrant testing equipment. May 1999: Training and examination in surface testing method Levels I and II.

**NATIONAL COMMITMENT:** Staff and facilities of CARSI, identification of engineers and technicians for training, examination and certification on different methods and levels of NDT; a quality assurance department; an exposure room to be constructed to prescribed radiation protection standards; all the infrastructure necessary for setting up the national NDT centre.

**AGENCY INPUT:** National training courses in Level II radiographic testing and Level III preliminary test; NDT certification scheme; two ultrasound national training courses; an X-ray industrial unit, apparatus for gamma radiography, darkroom accessories and radiation protection equipment; training material; magnetic particle testing and liquid penetrant equipment; on-the-job training.

**PROJECT IMPACT:** The qualification and certification of a substantial number of NDT personnel at CARSI in four NDT techniques and at three levels will lead to improvements in safety and quality of construction of major development projects in industry, communications and civil engineering, including the gas pipeline from Russia, the high voltage electricity distribution line linking Macedonia with Bulgarian and Albanian systems, the 400 kV electricity distribution line between Bitola and Skopje, and a new rail line from Bulgaria. The quality and competitiveness of manufacturing products for export will be improved.